**Find distance given mass, velocity and time**

A 100-kg auto enters a freeway onramp at 20 m/s and accelerates uniformly up to 40 m/s in a time of 10 s. How far does the auto travel during that time?  
  
I am unsure what I am looking for here...I know I am seeking distance, but am I seeking it through d=rt, where I discern the rate by going 40m/s - 20 m/s divided by 2 to get average rate (10 m/s), and then plugging that into d=10m/s x 10 s? I get 100, but...That looks wrong to me, my units look wrong...but then, I try d=1/2at\*\*2, so that d=1/2 ??? (10)\*\*2, where I am just guessing at acceleration by saying 40m/s-20m/s to get 20, giving me 1000, that's crazy...I am lost, hopelessly lost. Or is this where I have to get v=at before I can proceed onto another equation???



d= rt is only true as long as "r" (rate of change, speed) is a constant.

If acceleration is a constant, then & change in velocity = at and d= (1/2)at2+ v0t.

If the vehicle accelerates from 20 m/s to 40m/s then & change in velocity = 40-20= 20. Since that happens in 10s.,a= 20/10= 2m/s2.

Now putting that into d= (1/2)at2+v0t gives

d= (1/2)(2)(10)2+ 20(10)= 100+ 200= 300 m.  
  
As long as the acceleration is constant, you **can** use "average speed". The initial speed was 20 m/s and final speed was 40 m/s so the "average speed" is (40+20)/2= 30 m/s. That average speed for 10 seconds gives 30(10)= 300 m as above.